

CHAPTER THREE: POTENTIAL PWC MANAGEMENT STRATEGIES

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POTENTIAL PWC MANAGEMENT STRATEGIES

Recreational boating is associated with a variety of natural resource impacts and multiple-user conflicts including air and water pollution, habitat destruction, wildlife disturbance and public safety threats. Although these issues can be linked to all vessel types, the past few years have seen an increase in public concern regarding PWC. These vessels, with their high-speed maneuverability and high-pitched whine, have drawn significant attention from local officials and resource managers and are often at the forefront of boating management initiatives.

Several management approaches can be used to reduce the adverse ecological and/or social impacts of recreational boating. They range from rather low-key voluntary measures to strict legal regulation and outright prohibition. In between there is an array of intermediate actions such as zoning, licensing, mandatory education and pollution and noise abatement measures (NWSC 1996). These approaches can be modified to address the specific issues or concerns of a given community and can be used either independently or in combination.

3.1 USAGE RESTRICTIONS

According to the USCG, PWC are classified as Class A inboard motorboats and are subject to the same rules and regulations as other motorized vessels. For example, PWC must be registered in their principal state of use, they must have registration numbers displayed properly and they must be equipped with certain safety devices. PWC operators must also obey the "rules of the road" laid out in the Inland Navigational Rules Act (33 U.S.C §2001-2073) and they can be punished for dangerous or negligent operation (USCG 2001). In addition to these federal regulations, many local and state governments also have the authority to restrict PWC use. Box 4 summarizes the most common PWC restrictions used in the United States. When properly enforced, these restrictions potentially reduce the number of accidents, fatalities and user conflicts commonly associated with PWC use.

Box 4. Number of States* Using Selected PWC-Specific Restrictions

Require PWC operators & passengers to wear PFDs	52
Require a minimum age for PWC operation	51
Prohibit PWC use at certain times of day or night	50
Prohibit wake jumping	44
Require "kill switches" and/or safety lanyards	42

**Includes American Samoa, the District of Columbia, Guam, the Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands.*

Source: NASBLA's *Reference Guide to State Boating Laws, Sixth Edition (2000)*

Almost all states have a minimum age requirement for PWC operation and 33 states require an adult to be on board when a minor is operating a PWC. Furthermore, 12 states have

issued a PWC-specific speed limit and many other states regulate PWC speed by enforcing "negligent operation" statutes. These statutes include: 1) "Slow/No-Wake" restrictions near shorelines, fixed structures or public swimming areas, 2) restrictions on use near other vessels and 3) restrictions on wake jumping or the towing of waterskiers. Finally, 25 states require PWC renters to receive some sort of safety education a few states require PWC operators to have accident and/or liability insurance (NASBLA 2000). Appendix B, adapted from the National Association of State Boating Law Administrator's (NASBLA) *Reference Guide to State Boating Laws*, summarizes PWC usage restrictions by state. Appendix C contains model legislation that was developed by NASBLA to facilitate uniform PWC laws and regulations across the country. Several states have adopted the legislation as written and many other states use versions that are similar.

3.2 ZONING

Zoning is a planning and management tool that enables resource managers to accommodate a wide variety of human activities and resource uses in a given area. When properly designed, zoning balances the protection of sensitive natural resources and with a variety of human activities. Zoning restrictions are usually backed with subordinate legislation but, in some cases, compliance may be voluntary.

There are many types of zoning (i.e., ecological or social) but most strategies typically employ variations of temporal, spatial and regulatory zoning.

- **Temporal Zoning**
Temporal zoning separates incompatible activities and resource uses by partitioning the time that they are allowed. Depending on the resources or factors involved, temporal partitions may be hourly, daily, seasonal or long-term. For example, temporal zoning could prohibit commercial fishing in a sensitive wildlife habitat area during the mating or nesting seasons but allow these uses at less critical time periods. Temporal zoning could also allow non-motorized vessels to operate all day, while restricting motorized vessel use to the afternoon hours.
- **Spatial Zoning.**
Spatial zoning (also known as "conservation" zoning), divides geographic areas into sub-areas--or "zones"--that are distinguished by their unique resources and management objectives. Depending on these resources and objectives, human use is regulated and specific activities are either encouraged or restricted. For example, motorized boats might be prohibited from entering a designated swimming area, recreational diving might be restricted in sensitive coral reef areas and fishing might be limited (or prohibited) in an area with struggling fish populations.
- **Regulatory Zoning.**
Regulatory zoning sets specific restrictions on activities that are permitted in a given area or time period. For example, motorized boating may be allowed but restricted to a

certain speed or recreational fishing may be allowed if conducted on a "catch-and-release" basis.

Although many resource management strategies only use one type of zoning, combinations of temporal, spatial and regulatory zoning have also proven to be quite effective. Zoning is most commonly associated with land use planning, but it is also being used, with variable success, in coastal and marine areas around the world.

3.2.1 Great Barrier Reef Marine Park

The Great Barrier Reef, located off the east coast of Queensland, Australia, is the world's largest and most diverse coral reef. It is over 1250 miles long, up to 70 miles wide and supports thousands of marine coral, fish, wildlife and invertebrate species. The Great Barrier Reef Marine Park Authority (GBRMPA) is responsible for the "protection, wise use, understanding and enjoyment" of the Great Barrier Reef. To facilitate this objective, the GBRMPA uses marine zoning as its primary planning and management tool. The park is spatially divided into 13 zones (see Appendix D), each having a unique management plan and set of restrictions. For example, General Use Zones allow for a diverse range of recreational and commercial activities but Scientific Research Zones prohibit any human entry except for scientific purposes. Each zone has an underlying set of conservation objectives that were determined thorough a public participation process (GBRMPA 1994).

The GBRMPA's approach has been widely used throughout the world as a model of effective marine zoning. In the United States, the National Oceanic and Atmospheric Administration (NOAA) used this model as the basis for the U.S. National Marine Sanctuaries Program.

3.2.2 U.S. National Marine Sanctuaries

In 1972, Congress passed the Marine Protection, Research and Sanctuaries Act and established the National Marine Sanctuary (NMS) Program. This program is administered by NOAA and serves to conserve, protect and enhance the biodiversity, ecological integrity and cultural legacy of several marine protected areas (NOAA 2001). Of the thirteen sanctuaries in the NMS program, two currently use marine zoning as a resource management tool.

Florida Keys National Marine Sanctuary (FKNMS)

In 1990, Congress passed the Florida Keys National Marine Sanctuary and Protection Act to protect and manage the diverse environments of the Florida Keys. As described in its comprehensive management plan, the FKNMS uses zoning in selected areas of the sanctuary. This small-scale zoning approach enables managers to disperse resource users away from sensitive areas, minimize user conflicts and reduce the intensity of impacts in heavily-used reef areas. It also allows them to address specific concerns (i.e., coral reef protection) in certain areas, while addressing general concerns (i.e., water quality) throughout the sanctuary (NOAA 1996).

The FKNMS uses five types of zones to minimize user conflicts, limit human resource consumption and facilitate human respect for and enjoyment of the sanctuary (see Appendix D). Although these zones were designed to protect natural resources, they have, in certain areas, resulted in *de facto* regulation of recreational vessel use. As such, the FKNMS can serve as a general model of marine zoning and can be adapted to regulate recreational boating in other areas. (Note: When the FKNMS Management Plan was adopted in 1996, it included certain PWC-specific regulations. However, in 2000, Florida passed a state law prohibiting the adoption of regulations that discriminate against a particular type of motorized vessel. Accordingly, PWC use is now permitted in all areas of the FKNMS where motorized boating is allowed.)

Monterey Bay National Marine Sanctuary (MBNMS)

The Monterey Bay National Marine Sanctuary was established in 1992 and is the largest marine protected area in the United States. Encompassing over 5,300 square miles, the MBNMS is characterized by its scenic coastline, beautiful beaches and diverse array of marine flora and fauna. It is a popular site for commercial and recreational activity and is a nationally recognized center for marine biological and oceanographic research.

The MBNMS contains 72 sites that are categorized into 13 types of marine zones (see Appendix D). Each zone has a distinct set of management objectives and specific human activities are either restricted or promoted based on these objectives. For example, PWC are prohibited throughout the Sanctuary, except in four designated areas and their access routes. Spatially zoning the use of these vessels has enable sanctuary managers to protect the area's natural resources and minimize user conflicts, while allowing for continued PWC use within the area (NOAA 1992).

3.2.3 Hawaii Marine Life Conservation Districts

The tropical reefs surrounding the Hawaiian Islands support an extraordinary diversity of coral and fish species. In an attempt to protect these valuable and beautiful natural resources, the Hawaii Department of Land and Natural Resources (DLNR) has designated a number of Marine Life Conservation Districts (MLCDs) throughout the island state. These districts were selected for their size, environmental quality, boundary location, marine life, public accessibility and public safety aspects. Within each district, human activities are permitted or prohibited in accordance with the natural resources found in the areas. For example, PWC are banned in districts where they may damage coral reefs, disturb visitors or conflict with economically important industries such as recreational diving and commercial fishing (Save Our Seas 1992).

3.2.4 Barnegat Bay, New Jersey

Barnegat Bay, one of the EPA's National Estuary Program sites, is a shallow lagoon-type estuary located in central New Jersey. It is a valuable natural resource and a popular vacation destination that supports a variety of recreational and commercial uses, including sailing, beach combing, bird watching, fishing, clamming and crabbing. The Bay also supports a

large and diverse group of motorized vessels (i.e., inboard/outboard motorboats, jetboats and PWC) (US EPA 2001).

In 1998, the Barnegat Bay Personal Watercraft Task Force (BBPWCTF) was formed to address the issue of PWC management. The BBPWCTF began by reviewing scientific literature, analyzing existing management strategies, listing relevant data gaps and identifying educational needs. Then, in May 2000, it released an "Issues Summary and Action Plan," which recommended a multi-faceted management approach entailing conservation zoning, enhanced law enforcement and public education.

The BBPWCTF Action Plan suggests that conservation zoning will enable resource managers to balance an array of issues and uses, including wildlife protection, commercial fishing interests and recreational use. The plan explains how temporal zoning can protect habitat areas during critical times of the year, while spatial zoning can keep PWC out of sensitive shallow water areas and confine them to more appropriate open water areas (Maxwell-Doyle *et al.* 2000).

In March 2001, the Tidelands Resource Council responded to the BBPWCTF's Action Plan by proposing New Jersey's first Marine Conservation Zone. The proposed zone, the Sedge Islands, is part of New Jersey's Island Beach State Park and has been placed under the jurisdiction of the state's Department of Environmental Protection (DEP). If approved by the necessary state officials and natural resource agencies, this plan will give the DEP the authority to restrict and/or prohibit PWC use within the Sedge Island Marine Conservation Zone (Southard and Collings 2001).

3.3 EMISSIONS REDUCTION INITIATIVES

Recreational motorboats and personal watercraft emit a variety of toxic pollutants such as BTEX compounds, MTBE and PAH. These toxic emissions degrade air and water quality and compromise the integrity of marine resources and ecosystems. To address these issues, the U.S. EPA passed new regulations regarding the manufacture of marine engines. These 1996 regulations are being phased in from 1998-2006 and are designed to reduce the hydrocarbon emissions of newly manufactured engines by 75% in 2025 (US EPA 1996). Similarly, in 1998, California's Air Resources Board (CARB) adopted its own, more stringent set of manufacturing regulations designed to alleviate the state's extreme emission and pollution problems. California requires newly manufactured marine engines to emit 75% fewer hydrocarbons by model year 2001 and 90% fewer hydrocarbons by model year 2008 (CARB 1998).

In addition to these overarching manufacturing regulations, state and local governments can pursue more specific regulatory and/or voluntary initiatives to reduce PWC engine emissions in their waters. Regulatory approaches include engine restrictions, certifications, permits and surcharges, while voluntary approaches involve consumer education and financial incentives (ODEQ 1999). Although few of these approaches have been utilized in the context of recreational boating, they are presented here to facilitate creative discussion and innovative problem solving.

3.3.1 Engine Class/Type Restrictions

The majority of recreational motorboats and personal watercraft are outfitted with carbureted 2-stroke engines. Research indicates that these engines are relatively inefficient and that they have significantly higher emission levels than direct fuel-injected (DFI) and 4-stroke engines (TRPA 1999). To reduce emissions, some communities are beginning to restrict the use of engines or vessels that are using older, more polluting technologies.

In June 1999, the Tahoe Regional Planning Agency (TRPA) passed a regulation prohibiting the use of carbureted 2-stroke engines on Lake Tahoe. PWC and motorboats operating in this area must now be equipped with either: 1) DFI-2-stroke engines; 2) 2-stroke engines that meets either CARB's 2001 or the EPA's 2006 emissions standards; or 3) 4-stroke engines. The TRPA Watercraft Enforcement Team enforces this regulation by patrolling the Lake every day during peak boating season. The Team also maintains a page on the TRPA website that provides information regarding the ordinance and specifically lists which PWC and outboard engine models are permitted on the Lake (TRPA 2001).

After some initial skepticism and challenges, TRPA's prohibition on carbureted 2-stroke engines has received widespread public support. Many local residents lend time and manpower to help patrol the Lake, looking for violators and educating visitors about the region's pristine resources and the need for the prohibition.

Engine class/type restrictions, such as TRPA's, enable communities to meet the demand for recreational boating opportunities, while reducing marine emissions and protecting the integrity of their marine and freshwater resources.

3.3.2 Model Year Class Restrictions

One of the arguments surrounding the regulation of marine engine emissions is that the regulations usually only apply to vessels and engines manufactured after the regulations are passed. Therefore, existing vessels are "grandfathered in" and a vast fleet of relatively highly polluting vessels remains in operation. This argument is especially pervasive in PWC management debates. It is suggested that, nationwide, there are over one million older PWC in use that continue to pollute coastal and marine environments despite the availability of newer, cleaner technologies. However, since the life span of a privately owned PWC is shorter than that of an outboard motorboat, the antiquated PWC fleet is turning over more quickly than the corresponding outboard motorboat fleet.

Regardless of relative turnover rates, local communities can regulate the use of older, more polluting vessels by implementing model year class restrictions that prohibit the use of engines that were manufactured before a certain date. For example, a community could try to reduce marine emissions by passing a bylaw that prohibits the use of PWC and/or outboard motors manufactured prior to 1998, when the EPA began phasing in its new marine emissions standards.

Model year class restrictions are an effective way for communities to enjoy the benefits of motorized recreational boating while ensuring that motorized vessels are using cleaner, more efficient engine technologies that pose less of an impact to the community's fresh and marine waters.

3.3.3 PWC Certification & Permitting Programs

Certification programs require all PWC to be approved by some governing body prior to being sold. Ideally, approval would hinge on the PWC industry's compliance with the new EPA emissions standards, which means that PWC engines should demonstrate at least a 75% reduction in hydrocarbon emissions by 2006. After 2006, no uncertified PWC (new or used) could be sold. Such a program would essentially ban the sale of carbureted 2-stroke PWC and remove them from the marketplace. However, certification programs place a heavy burden on both state agencies (because they require a costly and time-consuming amount of monitoring and enforcement) and PWC operators (because they are no longer able to sell their used crafts).

Permitting programs require PWC owners to purchase an engine permit (as well as their vessel registration) before operating on state waters. The cost of the permit reflects the relative emission level of each engine, with carbureted 2-stroke engine permits costing significantly more than DFI-2-stroke or 4-stroke engine permits. Ideally, the revenue generated by these permits pays for the program's administration and extra monies are channeled into consumer education and pollution remediation programs. Although permitting programs discourage consumers from purchasing carbureted 2-stroke PWC, they do not remove these polluting vessels from the market. Furthermore, like certification programs, permitting programs place a direct monitoring and enforcement burden on state agencies and a financial burden on PWC owners.

3.3.4 PWC Surcharge Programs

Surcharge programs impose an extra cost on the sale of carbureted 2-stroke PWC and reduce the cost differential between older, more polluting models and newer, cleaner ones. When combined with a rebate that is applied to DFI-2-stroke or 4-stroke PWC, a surcharge program would reward consumers willing to purchase a more expensive, yet more efficient PWC. While surcharge programs may be effective for new PWC sales, they do not guarantee that older, used PWC will be removed from the marketplace because consumers will most likely sell them through classified advertisements, yard sales and other venues.

3.3.5 Consumer Education Programs

Consumer education programs inform potential PWC buyers (and the general public) about the differences between carbureted 2-stroke, DFI-2-stroke and 4-stroke engines. These programs include information about the engines' design and performance attributes, as well as their relative environmental impact. This information is provided in various forms (i.e., brochures, posters, product labels, demonstrations and public service announcements) and can be distributed by a diverse array of partners (i.e., state agencies, marinas, boat dealers,

boat launches, environmental groups, user groups, trade groups and schools). These programs help consumers make more informed decisions and, for some, offer the personal satisfaction that comes from making an environmentally responsible purchase.

3.3.6 Consumer Incentives Programs

States can complement consumer education programs by implementing consumer incentives programs. These programs offer financial benefits and rewards to buyers who make environmentally responsible purchases. There are three basic types of consumer incentives that could be modified to entice PWC buyers: buy-back programs, product bundling and tax credits (ODEQ 1999). These programs have been quite effective in other contexts but they tend to be rather expensive and usually require sponsors and legislative approval to provide financial and administrative support. The effectiveness of these programs will be maximized if they continue until the EPA Final Rule effectively removes carbureted 2-stroke PWC from the marketplace.

Buy-Back Programs

Buy-back programs entice consumers by offering money to individuals who are willing to turn in their old carbureted 2-stroke PWC and purchase a new DFI-2-stroke or 4-stroke model. These programs can be expensive because the monetary reward must reflect the cost of the newer, more expensive model. To defray these costs, PWC buy-back programs may be sponsored by an organization, or a group of organizations, with ample capital and a vested interest in the consumer behavior of PWC operators (i.e., marine manufacturers, state environmental agencies, etc.).

Product Bundling

Product bundling programs entice consumers by offering free or discounted products to individuals who purchase DFI-2-stroke or 4-stroke PWC. For example, coupons or rebates on trailers, gasoline, PFDs and/or other PWC accessories could be given to buyers at the point-of-sale. These programs can be complex because they require PWC dealers to partner with other businesses and a significant amount of negotiation and coordination is required. Product bundling can also be expensive because the "bonus" package must be rewarding enough to persuade the buyer to purchase a more expensive PWC model.

Tax Credits

Tax credit programs provide a strong monetary incentive by allowing consumers who purchase DFI-2-stroke or 4-stroke PWC to deduct a specified amount from their taxes. Like other incentives programs, tax credits are costly because the deductions must be large enough to entice consumers to buy more expensive engines. They also require legislative action and do not ensure that the older, more polluting PWC are removed from the market or state waterways.

3.4 NOISE ABATEMENT

Various management strategies can be used to abate PWC noise; however, when selecting an appropriate strategy, it is important to remember that human noise perception varies significantly and is highly subjective. Therefore it is usually difficult to select a strategy that pleases all constituents. To minimize this type of situation, PWC managers may want to solicit input regarding acceptable noise levels from a variety of stakeholders, including shorefront property owners, natural resource experts, beach-goers, PWC operators and other boaters. To be effective, this input must be examined collectively and used to generate strategies that most, if not all, stakeholders can accept.

3.4.1 Reduce Engine Noise

To balance consumer demand for larger, more powerful PWC models with demand for quieter PWC, manufacturers have recently begun outfitting PWC with cutting-edge noise-reduction technologies such as mufflers, baffles and insulation. These technologies, combined with redesigned intake and exhaust systems, have enabled the industry to create PWC models that are significantly quieter than they were just a few years ago. However, since a large number of older, louder PWC are still being used throughout the country, communities may need to phase these older models out in order to effectively reduce PWC-related noise impacts.

Many phase-out strategies are similar to the actions explained in the emissions reduction section. For example, model-year class restrictions can be used to ban vessels that do not utilize updated sound-reduction technologies and certification or permitting programs can be used to periodically test and approve or disapprove of individual vessels based on their noise output. Consumer incentives such as tax credits and buy-back programs can also be used to encourage operators to trade their old PWC in for a newer, quieter model.

3.4.2 Setback Distances & Buffer Zones

Since atmospheric sound intensity decreases rapidly over distance, setback distances and buffer zones represent simple, yet effective ways to reduce boating-related noise levels. In general, noise levels decrease by 5 dB per doubling of distance over water and 6 dB per doubling of distance over land. In other words, if a vessel's noise measures 70 dB at 20 feet, it will measure 65 dB at 40 feet, 60 dB at 80 feet and so on. Although this reduction may not seem like much, human-perceived loudness is halved for every 10 dB noise decrease. To someone standing on shore, a vessel operating behind a standard 150-foot setback distance will sound about half as loud as one operating just 40 feet offshore (Komanoff and Shaw 2000). To this end, many communities have implemented setback distances ranging from 150-1500 feet, or .03-.25 miles.

However, as previously discussed, dB levels are often a moot point when it comes to PWC noise. Since these vessels have a relatively variable, high-pitched whine that is distributed fairly evenly across detectable octave bands, PWC are often more audible than other noise sources, which often makes them more annoying or disruptive to persons on shore. To

address this specific issue, setback distances and buffer zones can also be designed using "speech interference" measurements. This method entails measuring sound intensities in certain octave bands (preferably the 500, 1000 and 2000 Hz frequencies). To prevent vessel noise from interfering with "normal" conversation on shore, the average sound intensity in each of these bands should be below 30 dB (San Juan County Planning Department 1998). An excellent example of the applicability of this method comes from the Tahoe Regional Planning Agency, which, in response to resident complaints regarding watercraft noise, used it to create a 600-foot (~1/10th mile) setback distance for all motorized vessels operating on Lake Tahoe (TRPA 2001).

3.4.3 Speed Limits

PWC and other motorboats make considerably more noise when operating at high speeds or full-throttle than they do at lower speeds. Consequently, well-enforced speed limits are often effective at reducing PWC-related noise (PWIA 2000). Speed limits can be developed with various factors in mind (i.e., distance from shore or proximity to critical habitat areas) and can be tailored to suit the needs of a given community or waterway. For example, speed limits can be reduced to "no-wake" levels (~5mph) in shallow-water nesting areas or they can be set at levels more conducive to maneuvering through vessel traffic (~25-35 mph).

3.4.4 Zoning

Another effective way to reduce overall PWC noise impacts is to concentrate PWC use at a few locations (Komanoff and Shaw 2000). This approach reduces PWC use in specific locations where aesthetic or resource quality is at risk or where there are large numbers of resource users. In turn, zoning encourages PWC use in areas where there is enough water surface area to support a variety of uses or in areas where PWC use can continue far enough away from shore to not disturb beach-goers.

3.4.5 Operator Education

In many cases, public education campaigns have effectively reduced the noise impacts associated with PWC use (Burger and Leonard 2000). By distributing information and enhancing awareness, these campaigns potentially improve operator behavior and foster environmental stewardship. Educational campaigns can utilize various forums or media, depending on resource and budgetary constraints, and they are often most effective when used in conjunction with other management actions (i.e., speed limits, buffer zones, etc.). An excellent example of using education to reduce PWC-related noise impacts comes from Little Mike's Island in Barnegat Bay, New Jersey. Historically, this island has been a haven for a large colony of Common Terns. Unfortunately, in the mid-1990s, scientists found that the tern colony's reproductive success was suffering due to increased PWC use around the nesting area. Scientists noted that PWC operators frequently raced through the channel adjacent to the nesting area, disturbing mating birds and scaring them away from their nests. Due to this noisy and disruptive PWC behavior, the birds suffered almost complete reproductive failure in both 1996 and 1997 (Burger 1998).

In light of this, in 1997, a local group of scientists and citizens convened a series of public forums to discuss PWC use and noise-related wildlife disturbance around the island. These forums, which were attended by private citizens, state officials, industry representatives, marine police officers, marina owners, livery operators and PWC owners, resulted in creation of a multi-faceted management strategy that protected both the birds and the interests of the PWC operators. The strategy entailed a broad educational campaign that provided PWC rental businesses and marinas with information to pass on to their clients regarding the nesting terns and the threats they faced due to PWC noise and operation. It also entailed creating no-use areas around critical nesting sites and marking them with buoys. These areas were patrolled by marine police officers who approached negligent operators and informed them about the harm they were causing. At the same time, the state of New Jersey began requiring all PWC operators to take a 3-hour course on PWC safety, noise and potential environmental impacts (Burger and Leonard 2000).

Taken together, these management efforts were extremely successful. Studies show that prior to their implementation, PWC represented almost 60% of the boats that went past Little Mike's Island and that over 50% of these PWC went "racing" by with a large wake. However, in the years following the start of the educational campaign and the installation of the buoys, these statistics dropped to 30% and 20%, respectively. More importantly, by 1999, the reproductive success of the island's Common Tern population returned to pre-1996 levels (Burger and Leonard 2000).

3.5 PWC LICENSING & CERTIFICATION

As previously discussed, most PWC accidents are attributed to three factors--inattention, inexperience and inappropriate use of speed. These factors typically arise from a lack of operator training and are exacerbated by the fact that PWC have certain characteristics (i.e., speed, maneuverability and power-dependent steering) that make them more difficult to control than other vessels. Although some states require teenagers and/or PWC rental customers to take a boating safety course, most PWC operators receive little or no training before taking off. As a result, this user group may be less familiar with navigational rules and PWC safety precautions and may be more likely to behave recklessly or irresponsibly (NTSB 1998).

In light of this situation, several states now require PWC riders to obtain a safety certificate and/or operational license similar to those required for driving an automobile. Licensing and certification requirements are presumed to enhance public safety by providing PWC riders with the knowledge and skills they need to operate on the water in a safe and responsible manner. Certification and licensing procedures acquaint operators with vessel operation, waterways rules and the specific laws and regulations that apply to their vessel, location and situation. Although most licensing or certification requirements only apply to minors and/or PWC rental customers, several states are beginning to extend these requirements to all PWC operators and/or other boaters (NASBLA 2000).

To obtain a license or certificate, operators are required to pass a knowledge test and, in some states, they must complete a specified amount of in-class or on-the-water training.

During the process, operators are exposed to general material, such as boating safety and navigational as well as special topics such as vessel operation, environmental sensitivity and public courtesy. The process usually entails a moderate fee, which is often earmarked and channeled back into boating safety and education programs. In many states, licenses and certificates must be renewed on a regular basis.

Finally, a poll conducted by the NMMA indicates that, although only 25% of PWC operators favor licensing and certification, 48% of them would like to see more PWC operation and safety courses. Conversely, 26% of experienced boaters and 30% of new boat buyers favor licensing but only 20% and 26%, respectively, would like more training courses (NMMA 1999). To bolster public support for boater licensing and certification, many insurance companies offer discounted rates to licensed and/or certified boaters and PWC operators.

3.6 PWC EDUCATION

Inappropriate operator actions and decisions cause most PWC-related safety incidents, legal infractions, environmental mishaps and social nuisances. Therefore, regardless of their different roles or opinions, almost everyone involved in PWC management agrees that operator education is the key to promoting safe and responsible PWC use. According to recent reports, 33 states require some sort of boating education, 25 states require further education for PWC operators and several other states have mandatory boating education laws pending (NASBLA 2000). Although these requirements usually only apply to minors and/or PWC renters, many states are considering mandatory education for all PWC operators.

Current PWC education programs vary by state and include both mandatory and voluntary approaches. These programs are used by local municipalities, government agencies and non-profit organizations to 1) inform riders about unique PWC design and operational characteristics, 2) raise awareness of PWC issues and clarify misperceptions regarding the environmental and social impacts of PWC use and 3) foster environmental stewardship among PWC operators. They typically entail formal in-class instruction and, in some cases, are supplemented with on-the-water training sessions.

3.6.1 PWC Education Standards

For over 10 years, NASBLA has been involved in boating education by creating content and curricula standards for boating education courses. NASBLA's standards guide the public and private entities that design classroom and training materials by outlining the knowledge level necessary to facilitate legal, safe and responsible boating. The standards, listed in Appendix E, delineate the minimum information that must be presented during a typical (6-8 hour) NASBLA-accredited boating education course. Educators are even encouraged to surpass these standards if they believe it will benefit their students (NASBLA 1999). For example, NASBLA recommends including information about specific vessels, geographic areas or weather conditions if it is relevant to the operators taking the course.

When NASBLA revised its boating education standards in 1998, it recognized the rising popularity of PWC and included a new standard relating to PWC use. The new standard explains the design and operational characteristics of PWC, informs riders about accidents and injury prevention, clarifies PWC-specific laws and restrictions and encourages courteous behavior by PWC operators (NASBLA 1999).

Although PWC education experts usually emphasize the merits of formal in-class instruction, many are beginning to advocate for expanded use of on-the-water training sessions. They claim that these sessions ensure that PWC operators learn to maneuver safely and ride responsibly because trained instructors can supervise and instruct PWC riders as they practice their operational skills.

3.6.2 PWC Educational Materials

In recent years, a wealth of materials has been created to facilitate PWC education initiatives. These materials include informational videos, manuals, brochures and fact sheets, as well as behavioral "codes of ethics." Box 5 lists some of the materials created by public and private organizations that address PWC issues. Similar materials can be ordered from local, state and federal agencies, non-profit organizations and industry groups that manage PWC use in one context or another (i.e., resource management, environmental protection, law enforcement, boating safety and public health or welfare).

Box 5. Examples of PWC Educational Materials

An Environmental Guide for PWC Operators -- Personal Watercraft Industry Association
Environmental Guide for PWC Operation -- National Safe Boating Council
Jet Smart -- United States Power Squadrons (video & manual)
Jet Ski (PWC) Safety Tip Sheet -- Pennsylvania Trauma Nurse Association
Personal Watercraft Rider's Handbook -- Kawasaki Motors Corporation, USA
Protecting the Aquatic Environment: a Boater's Guide -- Canadian Coast Guard
Protecting Fish Habitat: a Guide for Fishermen and Boaters -- U.S. EPA
Protecting Paradise: Florida Keys Safe Boating Tips -- Florida Keys NMS (video)
PWC and Seagrass Flats -- Personal Watercraft Industry Association
Riding Rules for PWC -- Personal Watercraft Industry Association
Safe Boating Hints for Personal Watercraft -- California Dept. of Boating & Waterways
Safe Boating Hints for Personal Watercraft -- Oregon State Marine Board
Wave Safe: a Guide to Safe Operation of PWC in Florida -- Florida Marine Patrol

Additionally, Appendix F lists "20 Ways to Protect the Environment", a set of operational guidelines for PWC riders that was compiled and published by the PWIA.

3.6.3 PWC Industry Efforts

The PWC industry has supported a wide range of PWC education initiatives. These efforts focus on donating money to boating education programs and providing consumers with educational materials at the point-of-sale (i.e., operator manuals, on-product warnings and instructional videos). The industry also supports more specific boating education initiatives sponsored by the four major PWC manufacturers (PWIA 2000). Some of these initiatives include:

- Bombardier's "Get Caught Doing It Responsibly" Demo Day initiative reaches thousands of current and prospective PWC operators with its "Boat Smart From the Start" safety message.
- Kawasaki and California State University (Sacramento) have developed the nation's first university-accredited PWC education course. The course is open to students and the general public and utilizes Jet-Skis® to demonstrate safe and responsible PWC operation. Kawasaki also donates Jet-Skis® and PFDs to local and state boating agencies during its National Safe Boating Week.
- Polaris administers a PWC training program that requires all buyers to receive formal instruction regarding PWC operation and regulations before their vessel warranty can be registered.
- Yamaha's Get W.E.T. (Watercraft Education and Training) initiative offers a boating education program in conjunction with the United Safe Boating Institute. PWC operators who complete this course are rewarded with discounts on insurance and selected Yamaha PWC accessories. Yamaha also offers a NASBLA-approved, USCG-recognized online boating course and provides free rental education kits to PWC rental operations.

The Personal Watercraft Industry Association (PWIA) also supports operator education. In recent years, the PWIA has developed model legislation that integrates mandatory education requirements with stricter operational regulations. This legislation, similar to NASBLA's (see Appendix C), has been adopted, in whole or in part, in more than 40 states and has institutionalized education as a means to enhance safety and environmental sensitivity among PWC operators. In addition, the PWIA continues to create an array of educational materials for government agencies, national boating organizations and the general public and provides PWC rental agencies with free informational kits containing videos, brochures, decals and fact sheets (PWIA 2000).

3.7 PWC RENTAL RESTRICTIONS

Government and industry efforts to promote and institutionalize PWC education, licensing and certification programs provide buyers with the information and training necessary to enjoy a safe and enjoyable boating experience. They do not necessarily ensure, however, that this knowledge is passed on to operators who rent or borrow PWC. This situation is

problematic because PWC are more likely to be rented or borrowed than any other vessel types and most PWC safety incidents occur on rented or borrowed craft. In addition, nearly half of all PWC rental accidents involve out-of-state clients, most of whom are unfamiliar with the legal requirements, local restrictions and physical features of the waterways on which they operate (NTSB 1998).

Recent research suggests that PWC renters usually have significantly less boating-related knowledge and experience than PWC owners. For example, an NTSB survey shows most PWC owners have previously operated other types of vessels, whereas most PWC renters have not. In fact, the survey indicates that less than half of PWC renters have ever even operated a PWC. The survey also indicates that less than one-third of PWC renters receive operational or safety instruction from their rental agent or have to demonstrate riding ability prior to renting a vessel. Overall, these statistics substantiate NTSB's findings that most PWC rental accidents are attributed to inexperience and/or inattention and usually occur during the first hour of operation, while renters are trying to familiarize themselves with the vessel. Moreover, these statistics raise questions of whether or not rental agents are ensuring that their clients receive the information and training necessary to operate PWC in a safe and responsible manner (NTSB 1998).

In an attempt to enhance PWC safety, many states are tightening their restrictions on PWC rental agencies. At least 25 states now mandate some form of safety education of PWC rental clients and several states have increased their minimum age requirements for PWC renters. Meanwhile, a few states have developed comprehensive PWC rental regulations (NTSB 1998). For example:

- Minnesota requires PWC rental agents to provide required safety equipment and a copy of the state's PWC laws, as well as legal and operational information, free of charge to all clients. Minnesota also requires PWC rental agents to keep a record of all persons who rent PWC. For renters under the age of 18, this record must document the number of the "watercraft operator permit" that the state requires all minors to obtain.
- Idaho requires PWC rental agents to educate their clients about the safe operation of the vessel and to place a decal on the vessel that lists relevant boating laws and safety information. Concurrently, rental clients must accept the instruction and carry an "acknowledgement-of-education" form while operating the PWC.
- Florida requires rental agents to complete on-the-water checkrides of all clients prior to letting them take control of the craft.
- Nevada mandates that each person operating under a given rental contract must complete a PWC law/safety course.

Additionally, states can consider implementing measures such as mandatory supervision of PWC renters by trained staff members, mandatory insurance requirements for rental agents and their clients or the prohibition of PWC rental operations.

To facilitate these efforts, the National Recreation & Park Association (NRPA) and the USCG have created a reference manual that outlines "best business practices" for PWC rental operations. Building on standards put forth by NASBLA and the PWIA (see Appendix G), this comprehensive manual provides recommendations and guidelines for improving the educational and operational standards of the PWC rental industry and discusses topics such as personnel qualifications, legal requirements, customer education and safety/risk management (USCG and NRPA 2001). It also outlines several "Do's" and "Don't" for PWC rental customers (see Box 6).

Box 6. "Do's" and "Don'ts" for PWC Rental Customers

Customer Do's:

- Know the local water hazards and forecasted weather conditions.
- Understand the importance of protective wet gear, footgear, sunscreen, sunglasses, hat, etc, while riding a PWC.
- Scan the water constantly for other watercraft, bathers and objects.
- Ride defensively and use common courtesy and common sense.
- Follow the rules of the road and abide by all navigational aids.
- Obey all posted signs and stay clear of restricted areas.
- Be aware of and respect environmentally sensitive areas.
- Know the operational characteristics of the watercraft (stop, turn, reboard, etc.) and its capacities and limitations (fuel capacity & consumption, etc.).
- Respect the rights of all other water and land users.
- Know, understand and follow ramp and/or waterfront landing etiquette.
- Obey all posted speed limits and no-wake zones.
- Understand the regulatory and contractual necessity of proper boat handling.
- Understand all items as specified in the ride center rental agreement and waivers.
- Know the assumed risks and consequences, as well as the fines for non-compliance and the potential for injury caused by careless or reckless behavior while riding a PWC.
- Understand that the operator must stay tethered to the PWC with the safety lanyard and wear the authorized operator identification (where applicable).
- Understand that the rental can be summarily terminated at the discretion of the ride center for, among other things, inappropriate behavior and/or general misconduct.

Customer Don'ts:

- Use alcohol or drugs.
- Engage in reckless behavior and/or spraying others.
- Jump wake within restricted limits.
- Overload a PWC--know its capacity.
- Get too close to other vessels or users.
- Operate the PWC in shallow waters less than 2 feet deep.
- Pollute the environment or disturb local wildlife.
- Ignore sudden changes in apparent weather or water conditions.
- Disobey ride center guidelines, instructions or policies.
- Disobey local, state or federal boating rules, regulations and practices.
- Allow the PWC rental to be operated by anyone who has not completed the required ride center PWC rental training, testing and rental agreement documentation.
- Operate above idle speed within 100 feet of other PWC, boats, users, etc.

3.8 PROHIBITION

The most definite method of eliminating adverse PWC impacts is to ban their use completely. Although a less stringent approach may meet management objectives, outright prohibition may be necessary under certain environmental conditions or when certain community characteristics are at stake. Several attempts to prohibit PWC use throughout the country have had varying degrees of success. The following case studies provide insight into the rationale and legal processes underlying various PWC prohibitions.

3.8.1 San Juan County, Washington

In January 1996, San Juan County, Washington became the first local government to pass an ordinance prohibiting PWC use. San Juan officials took this action to respond to local residents, who had been expressing widespread concern regarding PWC design and use and the potential impacts that these vessels might be having on the area's serene character and pristine natural resources.

The ordinance called for a 2-year prohibition of PWC use, during which time researchers could more thoroughly examine the issue and determine if and where PWC use might be appropriate. However, shortly after the ordinance passed, the county was sued by a group of PWC business owners, operators and industry lobbyists. The group argued that, since the state's boat licensing rules did not distinguish between PWC and other motorized vessels, that regulatory actions could not single out PWC and restrict them more harshly than other vessels. This argument prevailed in the county's Superior Court but, after a 2-year appeal process, the Washington Supreme Court overruled the lower court and upheld the county's right to ban PWC use. This 1998 decision set an important precedent for all local governments hoping to prohibit PWC use (Urban Harbors Institute 1999).

During the appeal process, a group of scientists and San Juan County planners prepared a comprehensive report on PWC and their impacts on natural and social environments. This report synthesized an array of existing information regarding water quality, wildlife disturbance, safety and noise. It examined how PWC are designed, marketed and used and compared PWC safety records and usage demographics to those of other vessels. Moreover, it catalogued the region's unique marine resources and compared the effectiveness and feasibility of a variety of other management strategies (San Juan County Planning Department 1998). In the end, this report gave San Juan County the justification it needed to ban PWC permanently. Furthermore, it has been cited in PWC debates around the country and continues to serve as a model for local governments desiring to prohibit PWC use.

3.8.2 Marin County, California

In November 1999, officials in Marin County, California passed an ordinance that prohibited PWC use in the coastal waters and estuaries flanking the Golden Gate Bridge. However, county officials soon began to struggle with enforcement issues. For example, the county only had one boat to patrol a sizeable area comprised of two coastlines and several inland waterways. Moreover, the county only had actual jurisdiction over some of its waters. Remaining waters were controlled by various cities that were not willing to pass their own local ordinances to strengthen the county's ban. Consequently, the area became an erratic "jigsaw puzzle" of navigational rules (Urban Harbors Institute 2000).

This ordinance was quickly challenged by a group of PWC constituents comprised of PWC owners, dealers, manufacturers and lobbyists. This group sued Marin County and, in 2001, the Marin County Superior Court overturned the PWC prohibition on the grounds that it was unconstitutionally vague. However, in July 2002, a state appeals court reinstated the ban, ruling that maps, landmarks and other available information could reasonably define the county's jurisdictional area and that PWC infractions could be challenged in areas where county boundaries were not clearly marked. Barring another appeal, which is possible, the Marin County PWC ban could take effect in the fall of 2002.

3.8.3 United States National Park Service

Although local or state prohibitions affect PWC operators most directly, no PWC ban has generated more controversy, debate or media attention than the one enacted by the U.S. National Park Service (NPS). In April 2000, the NPS issued a Final Rule (36 C.F.R. §3.24) that prohibits PWC from all National Park units unless a superintendent can show that PWC use is compatible with his or her unit's enabling legislation, resources, values, other visitor uses and overall management objectives (65 Fed. Reg. 15, 077-15, 000, Mar. 21, 2000).

By the Final Rule, the NPS immediately banned PWC from any park whose resource integrity, character or enabling legislation was inconsistent with PWC use. It then identified 21 specific park units in which PWC use might be appropriate and divided them into two categories (Table 7). "Park Designated PWC use Areas" included units in which water-based recreation was a primary purpose and where substantial motorized vessel use occurred. "Special Regulation PWC use Areas" included those units whose enabling legislation was vague or unclear regarding the relative importance or impact of recreational boating and PWC use. Each of these units was granted two years to evaluate the impacts of PWC use and, if appropriate, to allow PWC use via a Superintendent's Compendium or a Special Regulation (36 C.F.R. §3.24, 2000).

The NPS Final Rule was quickly challenged in court by the Bluewater Network, which argued that, by continuing to allow PWC use in these 21 park units, the NPS was violating its mandate to leave park resources unimpaired. As a result of this case's federally-approved settlement agreement, these parks are now required to undergo a formal rulemaking process to continue PWC use. In other words, a Superintendent's Compendium is no longer adequate and either an Environmental Impact Statement (EIS) or Environmental

Assessment (EA) must be completed in accordance with the National Environmental Protection Act (NEPA). PWC use is permitted in these units while they undergo the rulemaking process but the settlement terms mandate that the entire process be completed by April 2002 (for units that have created a Special Regulation under the Final Rule) or September 2002 (for units undergoing NEPA review) (US NPS 2001).

Table 7. Categories Regarding Potential PWC Use in Selected NPS Units

Park Designated PWC Use Areas

**Amistad Natl. Recreation Area (TX)*
 **Bighorn Canyon Natl. Recreation Area (MT)*
 **Chickasaw Natl. Recreation Area (OK)*
 **Curecanti Natl. Recreation Area (CO)*
 **Gateway Natl. Recreation Area (NY/NJ)*
 **Glen Canyon Natl. Recreation Area (AZ/UT)*
 **Lake Mead Natl. Recreation Area (AZ/NV)*
 **Lake Meredith Natl. Recreation Area (TX)*
 **Lake Roosevelt Natl. Recreation Area (WA)*
 #*Whiskeytown Natl. Recreation Area (CA)*

Special Regulation PWC Use Areas

**Assateague Island Natl. Seashore (MD/VA)*
 #*Cape Cod Natl. Seashore (MA)*
 #*Cape Lookout Natl. Seashore (NC)*
 #*Cumberland Island Natl. Seashore (GA)*
 **Fire Island Natl. Seashore (NY)*
 #*Gulf Islands Natl. Seashore (FL/MS)*
 #*Padre Island Natl. Seashore (TX)*
 #*Indiana Dunes Natl. Lakeshore (IN)*
 **Pictured Rocks Natl. Lakeshore (MI)*
 #*Delaware Water Gap Natl. Recreation Area (PA)*
 **Big Thicket Natl. Preserve (TX)*

Unit has prohibited PWC use or will prohibit use after the grace period expires.

* Unit is undergoing NEPA review to evaluate alternatives for managing PWC use.

In the wake of these legal actions, park superintendents and their staff have been scrambling to evaluate PWC impacts and use. Many of the National Seashores, such as Cape Cod, Cape Lookout, Cumberland Islands, the Gulf Islands and Padre Island, as well as the Indiana Dunes National Lakeshore have already banned PWC use (or plan to soon). However, many of the National Recreation Areas (except for Whiskeytown and the Delaware Water Gap), have decided to explore the potential for continued PWC use and are currently undergoing NEPA review. Therefore, at the time this document was printed, the final number of NPS units in which PWC use will be prohibited has yet to be determined.

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